

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) In a computing system that runs a diagnostic program for determining errors on a live volume, a computer program product residing on a physical computer storage medium for implementing, a method of ensuring against false error reporting during an online verification process by finding errors in a shadow copy of the live volume, the computer program product comprising one or more computer readable storage media having stored thereon computer executable instructions that, when executed by a processor, can cause the distributed computing system to perform the following:

receive a request to run a verification tool on a live volume in order to determine if errors exist thereon;

based on the received request, create a shadow copy of the live volume, which provides a logical duplicate of the live volume at a point in time, and wherein the shadow copy is divided into a plurality of blocks;

examine the shadow copy to verify an integrity of the live volume, wherein the shadow copy does not change during examination, but users still have access to the live volume during the integrity verification, wherein examination of the shadow copy can cause the distributed computing system to further perform the following:

receive a request for examining each of the plurality of blocks in the shadow copy;

determine if at least one block has changed in the live volume since the creation of the shadow copy, wherein if at least one block has not changed data for the plurality of blocks are retrieved and returned from the live volume, and wherein if at least one block has changed an unchanged version of the at least one block is retrieved and returned from a storage location where the at least one block was copied before it changed; and

based on the determination of whether or not the at least one block has changed, examine the plurality of blocks to verify an integrity of the live volume; and

based on the examination of the shadow copy, generate a report on the integrity of the live volume, which indicates to a user that one or more errors were found and that the live volume should be taken off-line in order to fix the one or more errors.

2. (Canceled)

3. (Currently Amended) The computer program product of claim 21, wherein the live volume is changed while examining the shadow copy to verify an integrity of the volume and wherein verifying the integrity is unaffected by any changes to the volume.

4. (Previously Presented) The computer program product of claim 1, wherein the live volume includes meta-data that comprises entries, wherein at least some of the entries comprise file and directory entries.

5. (Previously Presented) The computer program product of claim 4, wherein examining the shadow copy to verify an integrity of the live volume comprises searching the meta-data for file entries which no directory entry indexes.

6. (Previously Presented) The computer- program product of claim 5, wherein examining the shadow copy to verify an integrity of the live volume comprises searching the meta-data for directory entries which index a file entry wherein the file entry does not index the directory entry.

7. (Previously Presented) The computer program product of claim 5, wherein examining the shadow copy to verify an integrity of the live volume comprises searching the meta-data for a directory entry which is indexed by a file entry, wherein the directory entry does not index the file entry.

8. (Previously Presented) The computer program product of claim 4, wherein at least some of the entries comprise attributes of an object associated with the entry, wherein examining

the shadow copy to verify an integrity of the live volume comprises examining the at least some of the entries to verify that attributes included in each entry are correct.

9. (Previously Presented) The computer program product of claim 8, wherein one of the attributes comprises a length of a name of an object associated with the entry including the attribute.

10. (Previously Presented) The computer program product of claim 4, wherein examining the shadow copy to verify an integrity of the live volume comprises searching for unreadable entries in the meta-data.

11. (Previously Presented) The computer program product of claim 4, wherein the live volume includes meta-data that comprises entries and wherein examining the shadow copy to verify an integrity of the live volume comprises searching the entries for unreferenced security descriptors.

12. (Previously Presented) The computer program product of claim 4, wherein the meta-data indicates a hierarchy of the objects contained on the volume.

13. (Previously Presented) The computer program product of claim 4, wherein the meta-data indicates where objects are stored on the live volume.

14. (Previously Presented) The computer program product of claim 4, wherein the meta-data includes a security descriptor that indicates access rights associated with at least one object on the live volume.

15. (Previously Presented) The computer program product of claim 1 wherein the live volume comprises a raw volume.

16. (Previously Presented) The computer program product of claim 15, wherein the raw volume lacks a table that identifies objects contained on the live volume.

17. (Previously Presented) The computer program product of claim 15, wherein the raw volume includes a disk including partition information.

18. (Previously Presented) The computer program product of claim 15, wherein the live volume is accessed by a database engine.

19. (Previously Presented) The computer program product of claim 18, wherein examining the shadow copy to verify an integrity of the live volume comprises the database engine examining the shadow copy.

20. (Canceled)

21. (Previously Presented) The computer program product of claim 1, wherein the shadow copy maintains data found on the live volume at the selected point in time as the volume changes.

22. (Previously Presented) The computer program product of claim 1, wherein the shadow copy is created via at least one of a copy-on-write and split mirror.

23. (Currently Amended) In a computing system that runs a diagnostic program for determining errors on a live volume, a method of ensuring against false error reporting during an online verification process by finding errors in a shadow copy of the live volume, the method comprising:

receiving a request to run a verification tool on a live volume in order to determine if errors exist thereon;

based on the received request, creating a shadow copy of the live volume, the shadow copy comprising a logical duplicate of the live volume at a given point in time, and wherein the shadow copy is divided into a plurality of blocks;

examining the shadow copy to verify an integrity of the live volume, wherein the shadow copy does not change during examination, but users still have access to the live volume during the integrity verification, wherein examination of the shadow copy comprises:

receiving a request for examining each of the plurality of blocks in the shadow copy;

determining if at least one block has changed in the live volume since the creation of the shadow copy, wherein if at least one block has not changed data for the plurality of blocks are retrieved and returned from the live volume, and wherein if at least one block has changed an unchanged version of the at least one block is retrieved and returned from a storage location where the at least one block was copied before it changed; and

based on the determination of whether or not the at least one block has changed, examining the plurality of blocks to verify an integrity of the live volume; and

based on the examination of the shadow copy, generating a report on the integrity of the live volume, which indicates to a user that one or more errors were found and that the live volume should be taken off-line in order to fix the one or more errors.

24. (Original) The method of claim 23, wherein the shadow copy is created by one of a plurality of shadow copy providers that each exist on a system, each shadow copy provider capable of providing a shadow copy of the volume upon command.

25. (Original) The method of claim 23, wherein each shadow copy provider is designed to create a shadow copy for a particular type of application.

26. (Original) The method of claim 25, wherein the type of application comprises a volume verification application.

27. (Original) The method of claim 23, wherein the volume comprises a volume formatted in accordance with FAT, NTFS, or UDFS.

28. (Original) The method of claim 23, wherein the volume comprises a volume formatted for UNIX®, LINUX®, OS/2®, or BeOS®.

29. (Currently Amended) A computing system for running a diagnostic program for determining errors on a live volume, which ensures against false error reporting during an online verification process by finding errors in a shadow copy of the live volume, the system comprising:

a verification tool configured to receive a request to run an error diagnostic on a live volume;

a shadow copy provider arranged to create a shadow copy of a live volume, which provides a logical duplicate of the live volume at a give point in time, and wherein the shadow copy is divided by the shadow copy provider into a plurality of blocks;

an API arranged to interface with the shadow copy provider and to instruct the shadow copy provider to create the shadow copy based on the received request to run the error diagnostic on the live volume;

a verify disk component arranged to verify the integrity of the volume by examining the shadow copy of the volume, wherein the shadow copy does not change during examination, but users still have access to the live volume during the integrity verification, and wherein examination of the shadow copy comprises:

receiving at the verify disk component a request for examining each of the plurality of blocks in the shadow copy;

determining by the verify disk component if at least one block has changed in the live volume since the creation of the shadow copy, wherein if at least one block has not changed data for the plurality of blocks are retrieved and returned from the live volume,

and wherein if at least one block has changed an unchanged version of the at least one block is retrieved and returned from a storage location where the at least one block was copied before it changed; and

based on the determination of whether or not the at least one block has changed, examining the plurality of blocks to verify an integrity of the live volume; and

a report generator for displaying the results of the examination of the integrity of the live volume, which indicates to a user that one or more errors were found and that the live volume should be taken off-line in order to fix the one or more errors.

30. (Canceled)

31. (Original) The system of claim 29, wherein the shadow copy is maintained by actions comprising copying each block that changes on the volume to another location before the block changes, wherein a request to read data from the shadow copy for a block that has changed in the volume is satisfied with data from the other location.

32 . (Canceled)